

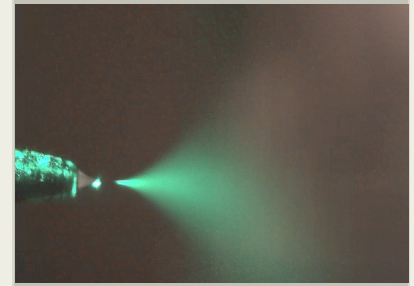
Electro-Kinetic Ice Gun for Frozen Ice Plume Simulations, Phase I

Completed Technology Project (2017 - 2017)



Project Introduction

This proposal evolved as a result of a conversation with a NASA scientist regarding plans for a mission to Europa to seek signs of life based on observed water plume emissions. With Jupiter as a bright light behind the moon, NASA was able to observe Europa in silhouette, and with ultraviolet light saw what appeared to be evidence of the plumes. If plumes exist, this is an exciting find, lead researcher William Sparks said. It means we may be able to explore that ocean, that ocean of Europa, and for organic chemicals, he added. It would allow us to search for signs of life without having to drill through miles of ice. The apparent plumes seem to be mostly around the south pole, Sparks said, although one appears farther north and may be a likelier candidate for a mission. "We presume it to be water vapor or ice particles because that's what Europa's made of, and those molecules do appear at the wavelengths we observed. In preparation for such a mission, spacecraft will have to pass through dense clouds of ice particulates, which could damage vital instruments. Accordingly, NASA has indicated there is a need for simulating the production of ice in the size range of 50nm up through 2 microns. The NASA Ames Vertical Gun Range was designed to sent solid projectiles for studying the effects of meteorite impacts on celestial bodies and potential micro-meteoroid damage to spacecraft. At the far end of the barrel, a gunpowder explosion is used to compress hydrogen gas to as much as 1 million times atmospheric pressure. The compressed gas gets released and sent down the launch tube, firing a projectile pellet at speeds between 7,000 and 15,000 mph. No ice particulate could survive being subjected to such massive transitory input of kinetic energy. The Ames gun was not designed for accelerating ice projectiles, so a new technology is required. Here is proposed an electrospray ice plume generator, with electrostatic acceleration.



Electro-Kinetic Ice Gun for Frozen Ice Plume Simulations, Phase I Briefing Chart Image

Table of Contents

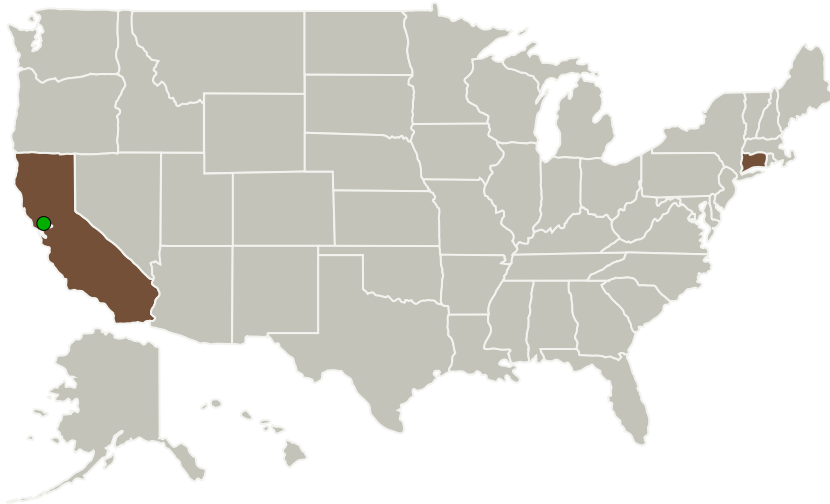
Project Introduction	1
Primary U.S. Work Locations and Key Partners	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Images	3
Technology Areas	3

Electro-Kinetic Ice Gun for Frozen Ice Plume Simulations, Phase I

Completed Technology Project (2017 - 2017)



Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Connecticut Analytical Corporation	Lead Organization	Industry	Bethany, Connecticut
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations

California	Connecticut
------------	-------------

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Connecticut Analytical Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

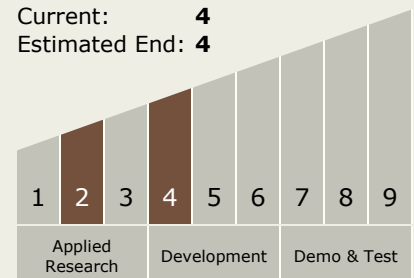
Joseph Bango

Technology Maturity (TRL)

Start: 2

Current: 4

Estimated End: 4

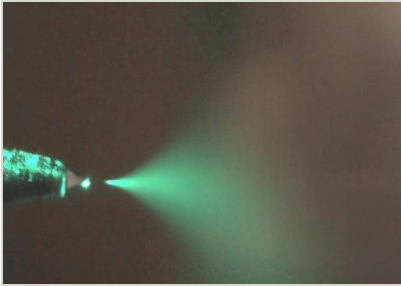


Electro-Kinetic Ice Gun for Frozen Ice Plume Simulations, Phase I

Completed Technology Project (2017 - 2017)



Images



Briefing Chart Image

Electro-Kinetic Ice Gun for Frozen
Ice Plume Simulations, Phase I
Briefing Chart Image
(<https://techport.nasa.gov/image/128973>)

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves